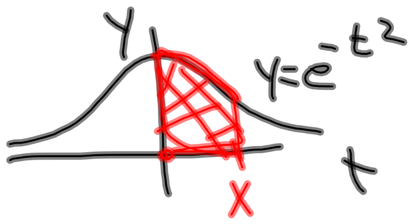
63

$y = \sin kx$ area under 1 arch $= \frac{2}{k}$

53 $\boxed{\int_0^x e^{-t^2}\,dt} = .6$

$\text{solve}\left(\int_0^x e^{-t^2}\,dt = .6,\ x\right) = .699$



Nov 15-9:22 AM

5.4b Fundamental Theorem of Calculus

proof of ftc

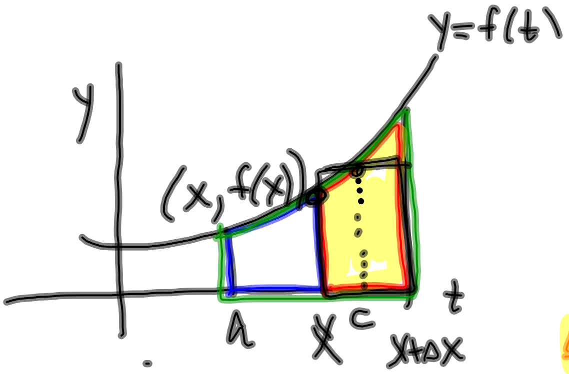
I. $\int_a^b f(x)\,dx = F(b) - F(a)$

where $F(x) = \int f(x)\,dx$ (antiderivative) (indefinite integral)

II. $\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$

$\frac{d}{dx}\big(F(x) - F(a)\big) = f(x)$

Nov 13-5:36 PM



$F(x)=\int_a^x f(t)\,dt$

$\Delta F = F(x+\Delta x) - F(x)$

we noticed

$\lim_{\Delta x\to 0} \frac{\Delta F}{\Delta x} = f(x)$?

$\lim_{\Delta x\to 0} \frac{F(x+\Delta x)-F(x)}{\Delta x}$

$\lim_{\substack{\Delta x\to 0 \\ c\to x}} \frac{f(c)\cancel{\Delta x}}{\cancel{\Delta x}} = f(x) = F'(x)$

Nov 15-9:43 AM

1.1 1.2 1.3 *Unsaved

$\frac{d}{dx}\left(\int_{-\pi}^{x} (\cos(t))\,dt\right) = \cos x$

$\frac{d}{dx}\left(\int_{0}^{x} \left(\frac{1}{1+t^2}\right)dt\right) = \frac{1}{1+x^2}$

Nov 13-5:38 PM

1.2 1.3 1.4 *Unsaved

$$\frac{d}{dx}\left(\int_1^{x^2}(\cos(t))dt\right) = 2x\cdot\cos(x^2)$$

chain rule

Nov 13-5:45 PM

1.3 1.4 1.5 *Unsaved

Find dy/dx

$$y=\int_x^5 (3t\sin(t))dt = -\int_5^x 3t\sin t\,dt$$

$$\frac{d}{dx}-\int_5^x 3t\sin t\,dt =$$

$$-3x\sin x$$

$$y=\int_{2x}^{x^2}\left(\frac{1}{2+e^t}\right)dt$$

$$y' = \frac{2x}{2+e^{x^2}} - \frac{2}{2+e^{2x}}$$

$$y = F(x^2) - F(2x)$$

Nov 13-5:47 PM

Find a function $y = f(x)$ with derivative dy/dx = tan(x) that satisfies the condition f(1)=2. Graph the function.

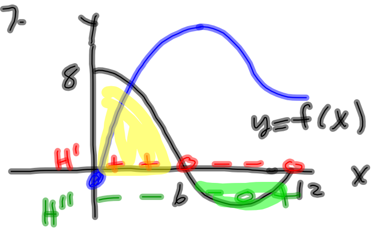
$$y=\int_a^x \tan t \, dt$$

$$2=\int_{a=1}^{1} \tan t \, dt + 2$$

$$y=\int_1^x \tan t \, dt + 2$$

Nov 13-5:57 PM

57.



$$H(x)=\int_0^x f(t)\, dt$$

a) $H(0)=\int_0^0 f(t)dt=0$

b) H inc when $H'>0$

$H'=f(x)$

$[0,6]$

c) $(9,12)$ concave up

d) $H(12)$ pos

because area between $(0,6)$ greater than area between $(6,12)$

Nov 15-10:21 AM